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Pulmonary vein thrombosis is associated with chest pain in patients without coronary artery stenosis

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Chest pain is a typical symptom of ischemic coronary artery diseases. Patients with ischemic coronary artery diseases typically have coronary artery stenosis, although approximately 10–20% of patients with angina pectoris have normal coronary artery, and most of these patients are syndrome X that showed slow coronary flow [1,2]. In addition, patients with chest pain but with an intact coronary artery stenosis were reported [3,4]. Although occlusion of the small coronary arteries has been suggested as a cause of chest pain and atherosclerosis [5], the origin of the microclots that cause coronary artery occlusions remains unknown. Pulmonary vein thrombosis was hypothesized to be a rare complication associated with lung cancers and thoracic surgeries; however, since 2012, I have published several cases of pulmonary vein thrombosis in elderly patients with chest pain using a 64-slice multidetector CT (64-MDCT) [6–10]. In 2014, I reported that 61% (35 patients) of 57 elderly patients with chest pain had pulmonary vein thrombosis as assessed using 64-MDCT [7]. A total of 26% (15 patients) of 57 patients with chest pain had significant coronary artery stenosis. This was diagnosed using 64-MDCT and was greater than 50% stenosis. In addition, 20% (7 patients) of 35 patients with a pulmonary vein thrombus had significant coronary stenosis, and 36% (8 patients) of 22 patients without a pulmonary vein thrombus had significant coronary artery stenosis.

A pulmonary vein thrombus can release microclots that occlude microvessels in all organs. Natural recanalization will occur in occluded microvessels, which may fail for various reasons. If recanalization fails, the small artery that is occluded and the associated regions will become hypoxic and undernourished, which disrupts the normal cell functions resulting in chest pain. It is possible that these patients had chest pain because of small coronary artery occlusions via microclots released by a pulmonary vein thrombus, and at least 74% (42 patients) may have chest pain because of a pulmonary vein thrombus.

In a number of cases, warfarin and dabigatran dissolved the thrombus in the pulmonary vein; however, I published a case demonstrating that dabigatran did not significantly dissolve a pulmonary vein thrombus [8]. During these therapies, no patients complained of chest pain. We must develop novel drugs to dissolve a pulmonary vein thrombus more efficiently with fewer side effects, such as bleeding. Hypoperfusion of a small coronary artery by occlusion is postulated to cause atherosclerosis [5]. Dissolving a pulmonary vein thrombus may prevent some angina pectoris and atherosclerosis by inhibiting the release of microclots from the pulmonary vein thrombus.

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